Incorporating "The Illuminating Engineer."

Light and Lighting

Official Journal of the Illuminating Engineering Society.

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The Prospects of the Illuminating Engineer

IN any Lighting Reconstruction Scheme due place should be found for planning not only the solution of future lighting problems, but the careers of the men who will have to translate principles into practice.

Ideas in regard to the training of the illuminating engineer of the future should become definite. The good start made by the initiation of examinations in illuminating engineering of the City and Guilds Institute, has been naturally hampered by war conditions. The present is a most difficult time, too, in which to develop technical education and facilities for young men entering upon specialised careers.

It has already become evident, however, that one general difficulty is the absence, throughout the country, of systematic courses in illuminating engineering, enabling students to prepare themselves for examinations.

It should be our future aim to meet this need, but this in turn raises another problem. The maintenance of such courses is dependent upon entries of students in sufficient numbers, and this in turn depends on the prospect that the period of study will be rewarded by adequate prospects of employment.

The fundamental difficulty at present is that the opportunities for experts in illuminating engineering are too limited, being, in fact, confined mainly to service with the chief firms in the lighting industry.

This is all wrong. There should also be many opportunities for independent lighting experts. We look forward to the time when every Government department, and every local authority, transport, public utility or commercial organisation of substantial size will have in its service, as a matter of course, one or two experts on illumination.

I.E.S. "Recommended Values of Illumination"

Another edition of the I.E.S. "Code" of industrial lighting, more properly known under the above title, has recently been issued. The changes in the existing text are small, being confined to a few alterations in the descriptive wording of the fundamental range of values (p. 5), necessary in order to correct a few inconsistences with values assigned to certain processes in the detailed schedule following. The only other modification is the addition, on the front inside page, of a short introductory statement reviewing briefly conditions affecting quality of lighting (such as glare and glitter, shadow, diffusion and the effect of surroundings) and referring readers to the remarks on these points in the Fifth Report on the Departmental Committee on Factory Lighting.

The status of the "Code" has been enhanced by the references thereto in the Factory Lighting Regulations, and fundamental changes would probably not be desirable at the moment, when it serves as a sort of official guide. We do not see need for any radical changes in the values of illumination in the immediate future, but we should like to see included eventually definite recommendations in regard to quality of lighting—certainly quite as important as the mere foot-candle values. When one bears in mind the emphasis placed on these aspects in the reports of the Departmental Committee, it is reasonable to infer that an I.E.S. Code should deal with these important matters in a similar manner—or even in greater detail—and we imagine that this will ultimately be done.

Mr. Percy Good, C.B.E.

A pleasing announcement in the recent List of Honours was the award of the C.B.E. to Mr. Percy Good, joint director of the British Standards Institution, and a past president of the Illuminating Engineering Society. The excellent work which Mr. Good has done as chairman of the Joint Committee concerned with A.R.P. lighting, from which the society has deservedly gained great credit, forms only a part of the valuable national service which he has rendered since the outbreak of war. Members of the society will join us in congratulating Mr. Good and in rejoicing that one of the society's leading members has been thus honoured.

I.E.S. Centres

We give elsewhere an account of the proceedings in Cardiff on June 19 when a representative committee to initiate the working of a new centre in the South Wales area was formed, with Mr. Edward Jones, City Electrical Engineer of Cardiff, as chairman, and Mr. S. G. Turner as honorary secretary. Following the election of this committee a general meeting, held at the Institute of Engineers, took place when addresses were given by Mr. W. J. Jones and Mr. H. C. Weston.

We understand that there is also a feeling that the time is becoming ripe for similar efforts in the South-West of England, including the area adjacent to Bath and Bristol, where there is already resident a nucleus of keen I.E.S. members. Any members or prospective members who are interested in the project of forming a "group" in this area should get in touch with Mr. J. B. Harris, 3, Lower Camden-place, Bath.

We also understand that the conference of representatives of centres at Leeds on July 2 was well attended and very successful, and that agreement was reached on a number of fundamental points affecting future policy. We are glad to learn that machinery is proposed for the systematic study of problems of common interest to the various centres, which seem likely to continue to increase in number and strength and to play an important part in the future development of the society. (Readers will note that we are adopting the term "Centre" without any qualification, such as "local" or "provincial"—additions which we believe are now felt to be unnecessary.)

New By-Laws

At an Extraordinary Meeting held on June 24 the Illuminating Engineering Society formally approved the new By-Laws, presented at the Annual General Meeting on May 13. The new version, which has already been circulated to members, will now be published in the Transactions, and will apply from now onwards. The only change in procedure of moment will be the more expeditious election of members, after names have been approved by the Council. It has for some time been recognised that the process of reading out names at two successive meetings, which sometimes involved delays of months before elections could be completed, was cumbersome and unnecessary. Under the new conditions these delays will be eliminated.

Reconstruction in the Gas Industry

The attention of readers may be drawn to the presidential address of Mr. George Dixon, who is also an I.E.S. Member of Council, delivered to the Institution of Gas Engineers last month, and to the enterprising symposium of nine contributions reviewing future problems in the gas industry. Although there is little reference to lighting therein these contributions have great general interest and are well worth study. We ourselves have been specially interested in Mr. Rupert King's review of rationalisation of the gas industry's technical press. Whilst ourselves strong believers in the freedom of the Press, we, too, attach great importance to close relations between technical papers and the industries and professional bodies they represent. To strike a correct balance between freedom, support and control is not easy. We are happy to think, however, that in the case of LIGHT AND LIGHTING the problem has been tackled with a good measure of success.

Problems in A.R.P. Lighting

In his lecture to the I.E.S. Midland Centre in Birmingham on May 23, Mr. E. W. Murray covered wide ground in connection with A.R.P. lighting problems. He discussed both the industrial lighting and external black-out conditions and reviewed the various regulations with which lighting must now conform. In connection with factories he drew special attention to the risk of crowds of workers streaming out into darkness before their eyes had become adapted. There are various means of meeting this problem, such as the grading of illumination to a low value near the doors and the use of light-locks. Dealing with external conditions, Mr. Murray emphasised the danger of glare. He contended that fittings should have a cut-off of 30°-35° even though this involved closer spacing and more expense. He discussed in some detail the design of war-time street lighting and other A.R.P. fittings, pointing out the danger that some light (even feeble light) emerging near the horizontal may illuminate vertical or inclined surfaces of walls and roofs, which thus become visible from above. In all weak lighting he emphasised the importance of getting maximum contrast and eliminating dazzle (such as is apt to arise in the case of some street traffic devices) which impairs the power of perception of the eye. The judicious use of white lines and whitened surfaces to enable obstacles to be perceived was emphasised. Mr. Murray described crane lighting as one of the most difficult operations from the A.R.P. standpoint. Here it is of great importance that nothing should be done to depress the sensitiveness of the eyes of operators in the darkness —indeed, the administration of codliver oil, which is believed to enhance night vision, might be advantageous, if the drivers would take it!

Lighthouse Beams

In a recently issued British Standard Specification* (No. 942—1941) much information is given in regard to a highly technical and intricate problem, the calculation of the intensity of lighthouse beams and beams from cognate apparatus. So far back as 1892 pioneering work in this field was done by Trinity House. More recently it has been studied in Holland by Mr. van Vloten, who developed a formula since submitted to the International Lighthouse Conference. Some criticism (based partly on the fact that the formula did not embrace many existing types of apparatus) has, however, been raised. The problem has since been taken up by the B.S.I., whose draft specification was circulated. Such expressions of view as have been received were favourable, but the outbreak of war made it impossible to obtain much comment from abroad. The main requirements to be fulfilled by a lighthouse light are that (1) it should be visible to the full extent of the range required from it, (2) the signals should present a distinctive appearance, (3) the duration of a sequence of flashes or occultations should be sufficient to enable a mariner to take bearings of the light, and (4) the apparatus should be efficient and reliable. The formulæ now proposed by the B.S.I. are based on the brightness of the source and the flashed area and efficiency of the apparatus, but also take into account the duration of the light. Apart from the formulæ presented the specification serves a useful purpose in summarising, in successive chapters, types of apparatus, sources and beams, and discussing the effect of brightness and dimensions of light source, colouration of beams, light duration of rhythmic beams, etc.

*Obtainable from the British Standards Institution, 28, Victoria-street, London, S.W.1 (price 3s. 9d., post free).

Fluorescent Tubes in Industry

Reference was recently made in this journal to the remarkable progress in the development of fluorescent lighting in the United States, where upwards of ten million tubes were produced last year. During 1941 this figure is expected to be doubled.

In this country developments are naturally restricted by present conditions. Yet, if full figures

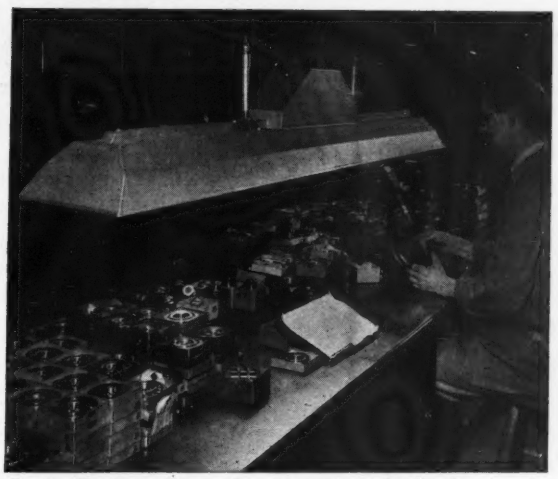


Fig. 1. The inspection and measurement of roller bearings is greatly facilitated by an Osira fluorescent tube. The mounting height is less than 20 inches.

were available it would doubtless be found that considerable progress has been made. The 5 ft. fluorescent tubes have proved very popular in industry, where the resemblance of the colour to daylight, the absence of glare and the soft "shadowless" nature of the light have proved to be great advantages. The tube, moreover, has one substantial advantage over daylight—the constancy of the light provided.

In the accompanying pictures we illustrate two recent installations of the Osira fluorescent tubes.

In connection with ball and roller bearing measurement (illustrated in Fig. 1) the low surface

Fig. 2. In the textile industry, too, the fluorescent tube is being extensively used. "Terrot" circular knitters for the manufacture of underwear.

brightness of the tube and its coolness, which enables a very low mounting height, and a correspondingly high illumination, to be attained, are very advantageous. The same applies to many other processes involving the inspection of finished metal parts, manufactured to dimensions which must be correct to a minute fraction of an inch.

In the hosiery trade the tube has been specially well received. The low height of the knitters permits uniform mounting of banks of tubes so that a system of localised lighting is accompanied by a high degree of diffusion.

Illuminating Engineering in the South Wales Area

Proceedings at a Special I.E.S. Meeting held in Cardiff on June 19, 1941

History was made on June 19, when an I.E.S. meeting was held in Cardiff for the first time, with a view to the ultimate formation of a new centre in this area.

A preliminary meeting of members and others interested in this project was held at the South Wales Institute of Engineers at 3 p.m. Amongst those who attended from other areas were Mr. W. J. Jones (President-elect). Mr. J. S. Dow (Hon. Secretary), Mr. H. C. Weston, and Mr. Howard Long (Birmingham).

Election of Local Committee

Mr. Edward Jones, Cardiff City Electrical Engineer, was invited to accept nomination as Chairman for the current session, and to preside over the meeting. Under his direction the meeting elected Mr. S. G. Turner as Honorary Secretary and nominated a very representative Committee of Management, which included Prof. C. S. Chubb, Mr. T. Scott Harrison, Prof. T. David Jones, Mr. J. H. Dinham, Mr. W. H. Stone, Mr. T. E. Algar, Mr. A. E. Luen, Mr. C. J. Page, Mr. D. C. Jones, and Mr. V. G. Wackrow. It was also agreed that Mr. R. J. Auckland, of the Cardiff Gas Company, and Mr. Johns, of Swansea, should be approached to act. Some discussion took place in regard to subjects for papers, in the course of which co-operation with the University and local engineering bodies was advocated.

It was agreed that the centre should be associated with the title of "The South Wales Area." [In the meantime, before the conditions necessary for the formation of a formal centre are attained, the nucleus of I.E.S. members will operate as a "group."]

At the subsequent general meeting, held in the lecture theatre of the South Wales Institute of Engineers, Mr. Edward Jones also presided.

The Work of the I.E.S.

Mr. W. J. Jones (President-elect) gave an address reviewing the work of the Illuminating Engineering Society, which, he recalled, started in 1909 with 80 members and had now nearly 1,000. He pointed out that one of the main objects of the Society was to provide a common platform where those concerned with different modes of lighting and independent experts interested in illumination could gather together and exchange experiences. He emphasised especially the desirability of securing the co-operation with those in the medical and ophthalmological professions and considering the needs of the human eye.

Mr. Jones quoted numerous instances of useful constructive work done by the Society in connection with the lighting of schools, libraries, cinema theatres, etc., on which reports had been issued. He also alluded to the so-called "code" of Industrial Lighting, framed by the Society, which was now being applied in connection with the Lighting of Factories Order. He recalled the establishment, under the City and Guilds Institute, of examinations in illuminating engineering, and the important step taken recently in granting "Fellowship" in the Society to those with the appropriate technical qualifications. He next reviewed some of the work done in connection with A.R.P. lighting problems by the Joint Committee, on which the Ministry of Home Security and the Society were jointly represented, dwelling on the enormous amount of work involved in the introduction of war-time street lighting, and mentioning the recently-issued report reviewing the fundamental factors underlying experiences of the eye under such conditions, which had been the subject of recent commendation in the medical press. Finally he mentioned that the Society was now passing on to a new phase of its work—the study of lighting problems in relation to post-war reconstruction—which was to be taken up by a representative committee.

Factory Lighting Regulations

Mr. H. C. Weston, who followed, traced the development of legislation on factory lighting. He recalled that this matter was under consideration before the last war, but only now, twenty-five years later, had statutory regulations, defining standards, been introduced. Mr. Weston pointed out that in normal times the State's concern in factories was mainly to prevent conditions apt to result in injury and ill-health. In war, however, when the maximum effort was demanded from industry, optimum working conditions were required—hence the standards of lighting now imposed, with the minimum working illumination of 6 foot-candles. Mr. Weston, however, also dwelt on the importance of "quality" of lighting, and summarised recommendations in regard to avoidance of glare and troublesome shadows, etc. He emphasised the special importance now attached to backgrounds of moderate brightness, so as to avoid the depressing "tunnel effect," and gave some account of the value of light coloured walls and ceilings in creating an impression and atmosphere of comfort and serenity. He alluded to the special qualities of the new fluorescent lamps, so closely approaching daylight in their effect. Factory industrial lighting in war time, he said, should be as good as we knew how to make it if it was desired to use the existing man-power at its full potential value. But it was necessary still to bear in mind that the workman is still the "whole man." Proper industrial lighting, whilst satisfying the need for excellent visibility of the work, must also satisfy the less tangible, but not negligible, psychological needs of the worker.

In the course of the meeting numerous references to developments in Cardiff were made. Mr. J. S. Dow congratulated the South Wales Area on its chairman and secretary, and joined with others in wishing it every success. He suggested that one of the chief aims, in forming a new centre, should be the study of lighting in connection with local industries.

A vote of thanks to the speakers terminated the meeting.

Illuminating Engineering Departments

by J. B. HARRIS

The technique of lighting application has developed to such an extent, that rule-of-thumb methods of planning schemes have, very largely, disappeared in favour of scientific design. To design a scheme on the basis of electrical load per unit area is just as approximate and inaccurate as planning a modern heating installation on the empirical formula of B.Th.U.'s per unit volume. Research and investigation conducted by physicists and engineers enables us to solve satisfactorily any type of lighting problem, and illuminating engineering may now be considered as a subject for inductive reasoning rather than solution by methods of trial and error. Modern illumination needs more consideration than is afforded by mere consultation of a catalogue of fittings or a visit to an electrical showrooms. This is now well understood by leading manufacturers of lighting equipment, who regard the development of the illumination department as a necessary and integral component of the firm.

The Illumination Department

The size of the department naturally depends upon the number of functions it has to serve, but generally it should be constituted as follows:—

1. *Technical Section.* This should be composed of qualified lighting engineers capable of preparing technical information in connection with lighting schemes.

2. *Artistic Design Section.* This should be staffed with artists capable of designing decorative lighting fittings and producing architectural impressions of completed lighting schemes.

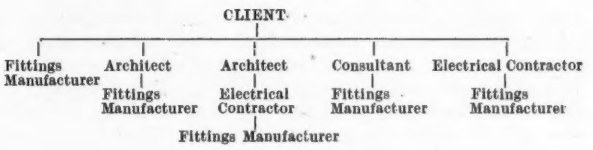
3. *Research and Testing Section.* A laboratory should be maintained for the testing and development of lighting fittings and the preparation of reports and relative technical data. The most important equipment required will consist of photometric apparatus, the nature and type depending upon the character of the fittings tested.

4. *Estimating Section.* This department is required for the preparation of tenders and quotations based upon technical requirements supplied by Sections 1 and 2 above.

Each of these sections has to work in close co-operation with the others, and the department as a whole will have frequent dealings with the main departments of the firm such as sales, publicity, works, so that the more harmonious the connection, the smoother will be the general progress. Outside representatives should possess a certain amount of technical knowledge in order to answer clients queries "on the spot," but this need not be extensive as all detailed planning inquiries should be referred to the illumination department. In modern catalogues informative data and technical information are expected. Those responsible for the production of the publicity material should therefore work in close conjunction with the technical department.

Nature of Inquiries

The inquiries which reach a firm naturally vary in scope. Some concerns specialise in the supply of fittings for some particular purposes, viz., street lighting fittings, industrial lighting equipment, etc. These inquiries are sometimes received direct from the client, but usually there are intermediary parties as shown in the accompanying diagram.



1. Direct receipt of an inquiry from the client enables the fittings manufacturer to appreciate any ideas which he may have, and permits full discussion as to their practicability.

2. Quite a large proportion of the requests for lighting proposals are received from architects acting on behalf of clients. As a result of educational work carried out by the Lighting Service Bureau of the E.L.M.A. and similar bodies, architects are beginning to realise the importance attaching to the planning of lighting details at an early stage in the general planning of buildings. Nevertheless, almost insurmountable difficulties in achieving desired lighting effects do still often arise—simply because of this lack of early consideration. In this connection it is suggested that all architectural schools should include in their curricula a series of lectures dealing with artificial lighting. The lighting engineer in turn should possess a certain knowledge of architectural fundamentals in order to appreciate the requirements of the architect. Architects frequently desire to light rooms indirectly by means of cornices, yet sometimes design the latter in full detail before approaching the illuminating engineer. If the cornice has been so constructed difficulties may arise in connection with the housing and concealing of the equipment, all of which could be avoided by closer and earlier collaboration. It is essential that any preconceived ideas of the architect should be well considered by the lighting engineer, in order that their practicability may be decided before construction begins. Running costs of the installation are very frequently a deciding factor in the choice of a scheme, and information on this point should be stressed in the final proposals.

3. Inquiries are sometimes received from electrical contractors who are in turn responsible to architects. From the viewpoint of the illuminating engineer this is apt to prove an unsatisfactory condition, as all information regarding the scheme is received "second-hand." The contractor may not wish even to disclose the name of the architect, and in some cases he is tendering for the job in competition with others and has approached more than one fittings manufacturer. The latter, therefore, prepares a detailed scheme in competition with other firms, yet not knowing the true requirements of the client. Where possible attempts should be made to obtain an interview with the architect. This is to the benefit of all concerned, since it is only when the complete lighting scheme has been discussed and generally approved that the contractor is able to make a true estimate for the installation. It is, therefore, preferable for the architect to approach, in the first instance, one or more fittings firms directly. Having decided upon the final scheme he should then invite electrical contracting firms to quote for the wiring installation.

4. Relatively small jobs often occur which merely involve rewiring, and where the services of architects are not requisitioned. The electrical contractor then acts partly as a consultant and prepares a complete scheme for his client. He approaches fittings manufacturers, usually with preliminary ideas expressed by the client, and invites them to quote for the lighting fittings. In order that a satisfactory scheme is finally installed, the contractor should accept the advice given by the illumination department of a reputable firm, whose experience is usually wide and varied. The costs associated with wiring will depend upon the scheme finally chosen, and if a general lighting system is decided upon the contractor should have no difficulty in choosing that which is most economical as regards fixed and running costs.

5. In the best interests of the client it is most satisfactory to employ the services of a consulting electrical engineer or lighting consultant. This will ensure that, in return for payment in the form of a

fee for services rendered, the client will receive sound advice of an unbiased character, comparable with that obtained from an architect regarding the construction and design side of the building. The function of the consultant is to plan the lighting scheme, prepare the specification, and invite various firms to submit tenders. He should possess sufficient technical knowledge of illumination to enable him to study the merits of any special equipment required for the achievement of certain specified results. The engineer should have the necessary apparatus for the testing of sample fittings, or should attend tests carried out at manufacturers' works or laboratories. By utilising the products of various firms it might be found possible to complete a scheme employing standard equipment only, thereby effecting economies which would be impossible if special reflectors have to be designed.

Work of Illumination Department

From the viewpoint of the lighting engineer the most uninteresting inquiry is that consisting essentially of a detailed specification requiring a quotation to a fixed number of fittings of a general type and size. Very little technical consideration is needed, and after the choice of fittings has been settled the inquiry is passed directly to the estimating section. This type of inquiry is usually received from a consulting engineer, electricity supply company, or a Government Department, all technical requirements being arranged beforehand. In order to strengthen the firm's chances of success the quotation should preferably be accompanied by technical information concerning the performance of the fittings proposed, together with illustrations of them. If, in the opinion of the technical section, any of the fittings specified are "underlamped" or "overlamped," mention should be made of these facts, as undesirable effects will follow. Information such as this will be welcomed by those responsible for the final decision regarding the acceptance of the tender.

In order to give manufacturers a greater degree of freedom, authorities such as those mentioned above sometimes forward plans of the buildings with the electrical points clearly marked, the questions of fittings and lamp sizes being omitted. The firm is thus able to recommend standard fittings which, in the opinion of the illumination department will be most suited to particular locations. If possible information regarding the approximate sum of money available should be obtained, as this will greatly influence the type of scheme proposed. Where warranted, alternative types of units should be suggested.

Generally, the firm receives unmarked plans and is requested to plan a complete lighting scheme. Assuming that an architect is concerned, it is necessary to seek an interview with him, or in some other way ascertain his views regarding the general question of the artificial lighting. If the building is an existing one, it should be inspected by a lighting engineer and also by a member of the decorative design section. Having obtained the preliminary ideas of the client, the engineer then proceeds to study the problem inductively. Having decided upon the illumination required for each room, the number and type of fittings are calculated, together with the general arrangement. Interiors such as cinema auditoriums call for artistic treatment, necessitating the design of special fittings, and as soon as the disposition and size of the fittings has been settled, the designer prepares his sketches. It is essential that the units are designed around the lamps and equipment, and the procedure must not be vice versa. If, for instance, indirect lighting is desired from cornices built on to the side walls, the engineer will decide upon, or specially design, the reflectors required for the light control, and will also determine the projection depth and location of the coves. The artistic designer will then draw the external contours in accordance with the above fixed limits. Certain problems may necessitate the conducting of preliminary experimental work, and the technical section should then collaborate with the laboratory. Some inquiries, especially those concerned with ecclesiastical buildings, entail visits to sites and the making of plans. Proposals submitted should, in general, consist of a full lighting report, marked plans showing the positions of the lighting points, illustrations of standard fittings and finished drawings of special fittings, and a complete schedule of fittings and prices. The client will then be in a position to study the tender from all points of view. Where possible, reference should be made in the proposals to relevant reports prepared by Government Committees or other authoritative bodies. For instance, an industrial lighting scheme should refer to the Departmental Committees' Report on Factory Lighting or to the requirements of the Factories (Standard of Lighting) Regulation, and to the I.E.S. "Recommended Values of Illumination," which Government Departments now demand. If a school lighting scheme is being prepared, reference should be made similarly to the recommendations on School Lighting prepared by the Illuminating Engineering Society. The tender is always given status if it includes references such as the above. In this connection it would be useful if committees were set up to study the lighting of hospitals, offices, etc., so that similar authoritative data may be available for reference.

Proposals are sometimes required for the design of special fittings only, to house a fixed number and size of lamps. The work involved here is usually of a purely decorative nature and is generally dealt with directly by the artistic design section.

Conclusion.

All firms give their services free of obligation, and architects and members of the electrical industry avail themselves of all such offers. As shown above, installations for large buildings entail the preparation of many drawings, together with a lengthy report and description of the scheme proposed. The submission of sample fittings, together with visits to the site, result in further expenses being incurred. The lighting installation for a large building is quoted for by at least three firms, the unsuccessful tenderers receiving no recompense whatsoever for the cost of labour and material involved in the preparation of the proposals, which, if put forward by a consultant, would entail the payment of a fee. Many clients tend to take advantage of the good services of firms, asking for one or more alternative schemes, and gaining the benefit of much technical information, which is frequently put to use in other directions.

In this connection it is suggested that action should be taken to clarify the situation in order to benefit all reputable firms, the most suitable body for performing this function being the Electric Light Fittings Association. All lighting fittings manufacturers of repute should be persuaded to join this association, and a code could be prepared involving the payment of a fee to all firms tendering for installations above a certain minimum value. This deposit would be returned by the firm securing the order, other manufacturers thereby receiving some recompense for expenses incurred. Furthermore, in order to aid architects and consulting engineers in the choice of suitable firms, the E.L.F.A. should possess a list of firms having technical departments and testing laboratories.

By this means it would be possible to establish the lighting industry on a firm basis, clean rivalry between the firms leading to the development of fair competition. It would be advisable to give early consideration to this matter to facilitate the solution of problems which will arise under post-war conditions.

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3. Provide adequate illumination
4. Eliminate dazzle or glitter from the general surroundings
5. Provide reasonable brightness of walls, ceilings or other surroundings
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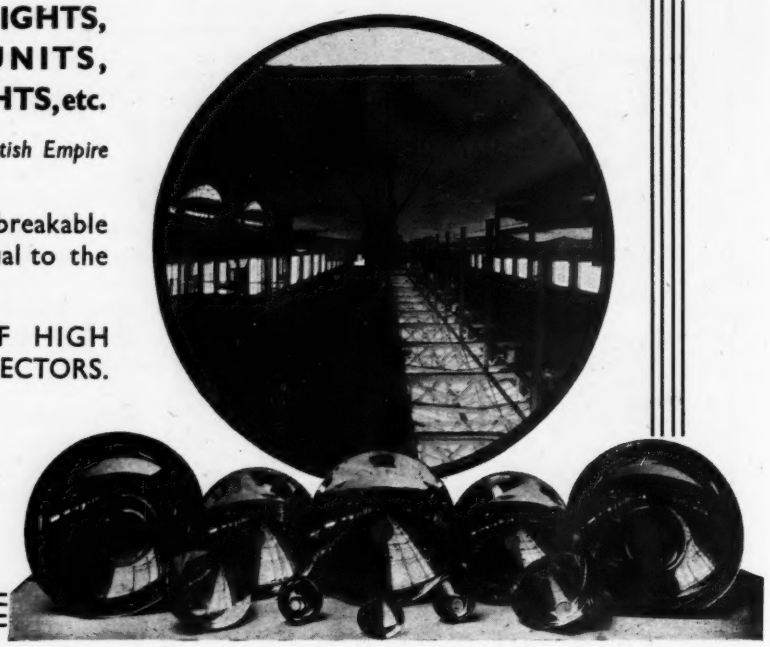

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The Illuminating Engineering Society (U.S.A.).

Notes on Transactions (April and May, 1941)

APRIL, 1941.

NEWS: An I.E.S. exhibit of lamps was arranged at the School Administrators' Convention in Atlantic City. The Society's "Recommended Practice of Street Lighting" is being widely circulated. An audience of 500 in Cleveland heard a recent lecture on Light and Safety, and a "Safety with Light" Calendar is being issued. An account is given of several new types of photo-flash lamps varying in peak output and duration of flash.

CONTRIBUTIONS: *An Engineering Analysis of Dental Office Lighting.* No single lighting unit can meet all requirements. Summarises the work of a committee which studied various systems of lighting. In general 100-200 ft.c. are desirable, with up to 1,000 ft.c. in special cases. Elimination of glare, provision of soft shadows, and maintaining quality favourable to colour-matching are also requisite. *Improved Illumination for Textile Operations with Fluorescent Lamps.* Briefly summarises advantages of the new system. *Effects of Tree Shading of Street Lights on Night Visibility, by K. L. Partridge.* Tabular records of tests are presented. It is inferred that the decrease in effective illumination due to shading varies from 23 to 40 per cent., with an average of 32 per cent. *The Lubrication of High Temperature Lighting Devices, by B. H. Porter.* The special uses of colloidal graphite are reviewed, and their application to searchlights, motion picture projectors, etc., discussed. *Nomograms for Routine Illumination, by W. M. Armstrong. The Illumination of Statuary, by L. R. Steinhardt.*

MAY, 1941.

NEWS: Regional Conferences are now being arranged, e.g., in Toronto (Canada), in the Great Lakes Region (where 343 members attended), and in New Orleans. Special applications of fluorescent lighting continue to be noted.

CONTRIBUTIONS: *The Illumination of Jewellery and Tableware, by F. M. Wolf.* The effect of different types of sources ("point," "line," and "sheet" sources) is illustrated by photographs of illuminated jewels. Special display boxes are illustrated, and the lighting of shelves devoted to chinaware, etc., discussed. *Characteristics of Low Voltage Fluorescent Lamps at High Frequencies, by R. F. Hays.* The advantages of such methods on aeroplanes, where frequencies of the order of 400 are commonly used, are emphasised. In such circumstances an efficiency 20 per cent. greater than that available on sixty cycles is attained. *Lighting Principles and Practice.* A Bibliography of papers dealing with lighting applications.

PHOTO: COURTESY B.T.H. CO. LTD.

VITREOSIL *in* FACTORY LIGHTING

Improvements in factory lighting have been accelerated by the war. One of the newest developments in lighting, the super-pressure Mercury Vapour burner, has only been made possible by reason of the well-known heat resistance of fused silica. Transparent VITREOSIL, pure fused silica, has been manufactured for over 30 years and is used in these new lamps of high efficiency.

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Bollard Lighting

(Communicated)

In view of the peculiar conditions existing in our streets by night, the possibilities of "low-level lighting," for example in connection with the illumination of bollards, have hardly been sufficiently explored. Such possibilities are illustrated in a new type of lighting unit for mounting on bollards which forms the subject of a recent patent.

The elements of the lighting unit are simple. The main feature is a specially designed reflector of spun metal, mounted at the top of the bollard so as to direct light downwards, and equipped with an upper protecting cover. This reflector is made built up of eleven surfaces, five of which are designed to project light over a wide area, whilst the remaining six are for local light projection. The lamp is mounted in an inverted position and is shielded from view, so that the illumination is mainly indirect. The overall diameter of the unit is 16 in. and the height 8½ in. With this unit it is possible, by fitting a metal spacer, to use a 15, 25, or 40-watt lamp. Coloured lamps may also be used for special effect (e.g., ruby to indicate the proximity of a fire alarm or apparatus, amber during fog periods, etc). Tests with two bollard units each mounted 3 ft. 6 in. from a pedestrian crossing and 10 ft. apart have given excellent results. Even illumination over the roadway and flood-lighting of pedestrians up to the waist line are secured, and the bollard itself is clearly revealed. All illumination is directed below the level of the eyes, which are thus freed from glare and able to make the best use of the illumination available.

CAPT. SCOTT

Light

ON THE PAST

This fine statue is the work of his widow, and was erected in 1915 by the officers of the Royal Navy. The inscription on the pedestal is the final paragraph in the diary in which Scott recorded his ill-fated expedition to the South Pole.

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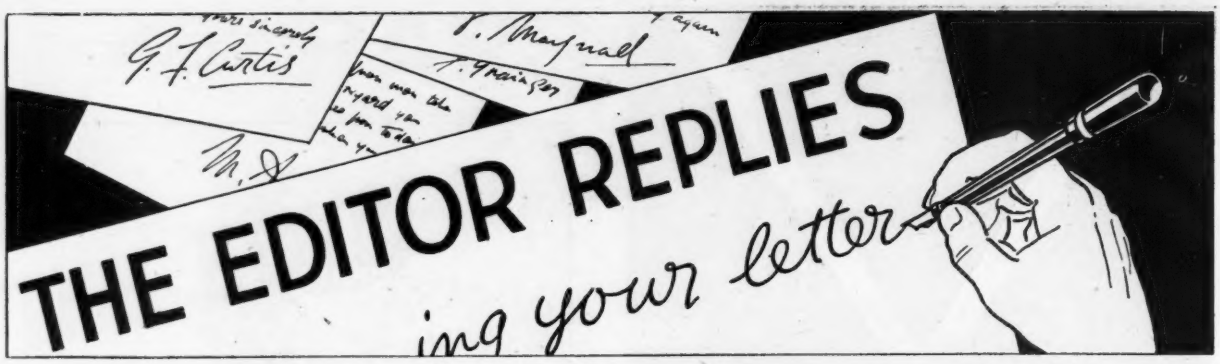

The extra summer time and the long hours of daylight have lessened greatly the inconveniences of the black-out. We have heard little recently of the problems that vexed us during the winter, and demands for alleviation are for the moment in abeyance. Nevertheless, it is well to remember that there will be a return to winter conditions in due course, and any feasible plans for promoting better visibility in the streets should be prepared before then. In the meantime, one notes a certain lack of elasticity in adaptation to summer conditions. For instance, **light-lock structures** might surely be set aside for the **summer**—at least in the case of premises closing early in the evening. It does seem odd to find people still squeezing, in full daylight, through light-lock passages into tea-shops—bearing notices that the closing time is 5.30 p.m.!

I still receive, from time to time, inquiries for **books on various aspects of illumination.** A correspondent points to the multiplicity of publications of the I.E.S., A.P.L.E., E.L.M.A., and other bodies, and urges concerted action to produce either a comprehensive work in three volumes (elementary, intermediate, or advanced) or a series of handbooks.

There are, however, several points that should be remembered in this connection. The aims and objects of books or pamphlets issued by different organisations are not always identical; though they may combine on occasion, they will often prefer to go their own ways in such matters. Reports containing definite recommendations on matters of common interest are, however, advantageously issued, with the endorsement of all the chief bodies interested in lighting. The so-called "I.E.S. Code" of factory lighting is a good example.

My own belief, however, is that *textbooks* are, in general, best prepared by authors and not by societies—even when different experts are commissioned to handle subjects on which they have special knowledge, the fact that they are, in some degree, supposed to conform to the beliefs and principles of the body concerned rather "cramps their style."

A further difficulty in connection with textbooks on illuminating engineering is that they so soon become out of date. For this reason **concise handbooks,** such as can be issued at frequent intervals and constantly revised, are, in general, to be preferred to costly and ponderous works on illuminating engineering, sold relatively slowly and rarely revised. Many general books available, whilst possibly excellent as regards principles, are already out of date in regard to facts—for example they were written before the coming of electric discharge lamps. The inquiries I receive suggest that the demand is now for specialised and up-to-date books. I have been asked, for example, not only for books on electric discharge lamps, but on the use of electric discharge lamps for street lighting, factory lighting, and other special fields of application.

It has been pointed out to me that the technical difficulties involved in accurate **colour nomenclature,** whilst certainly considerable, are as nothing compared with those associated with the customs, whims, and peculiarities of the trades making use of them. Names assigned to shades of colour are used with varying ideas of the tint actually intended. The terms for colours are even occasionally interchanged ("orange" and "yellow" is a case in point). The position is made even more complex by the adoption of fancy names which are not descriptive. Why, for example, should the names of localities or persons be associated with specific ranges of colours? (Can a colour be logically described as "Middleton-in-Teesdale," "Elaine," or "Ezra P. Bloggs"?), whilst there is also a tendency to coin brand new words to describe the particular seasonal shade of blue, brown, or scarlet. If the newly-formed colour group is also to struggle with these human frailties it will have its work cut out.

It has been stated in the Press that a contingent of special **"cat's-eye" airmen** is promised from Canada. As I have indicated previously, I rather doubt whether, by careful dieting and other methods, a species of super-vision in the dark can be developed; but something can no doubt be done by selection of those with natural aptitude and still more by training and careful preparation. It has been stated in America that capacity for seeing in the dark is highly developed amongst negroes, but one would like scientific confirmation. of this.

Recent letters from Mr. George Ainsworth, of New York, whose name will be familiar to many British illuminating engineers, contain good wishes and encouragement in these troublous times. Mr. Ainsworth also sends us an exposition of his views on the desirability of **"spatial" illumination,** as compared with projected or "squirted" illumination. His main argument in regard to daylight seems to be that we should not be slavish in our imitation, and should remember that daylight conditions vary greatly at different times, so that the eye has developed to meet *preponderant* conditions. Successful lighting, involving avoidance of glare, is largely a matter of keeping within certain natural brightness ratios. In planning the brightness of the ceiling and upper parts of the room we should bear in mind what happens in the natural sky.

Old Mill to Modern Factory

An interesting example of the conversions to war-time requirements which are constantly being made is afforded

by the old ring mill, illustrated above, which was recently taken over by Messrs. Edward Buck and Sons, Ltd., for the manufacture of their war-time "Bukta" products. Much structural reconstruction had to be undertaken and the existing self-generating electric plant was removed, current being taken instead from the local 6,600-V. H.T. supply and transformed down. Much special Crompton Parkinson electrical equipment was installed, but the interest of our readers will be centred chiefly in the lighting, which was effected by 200-watt half-frosted Crompton lamps in dispersive reflectors, furnishing 12-15 ft.c., dropping to 8-10 ft.c. in warehouses, stores, and passages. About 400 of these units in general, controlled by individual pull-type ceiling switches, are installed. Altogether there are about 1,400 lighting points of various sizes.

Lighting also plays a part in the complete A.R.P. system, the dispersal and regrouping of personnel being controlled and guided by "Kye" coloured lamps, route colours tallying with similar colours in the shelters.

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from page 90, June, 1941)

I.—RADIATION AND GENERAL PHYSICS.

131. Colour Systems and Their Relation.

D. B. Judd. Am. Illum. Eng. Soc. Trans., 3, pp. 336-364. March, 1941.

The I.C.I. tristimulus system of colour identification is described, and its relation to other systems of the same type is given. A number of colour systems based on material standards, such as filters and reflecting surfaces, are discussed. J. S. G.

132. The Bases of Colour Vision.

L. H. Hardy. Am. Illum. Eng. Soc. Trans., 3, pp. 295-312. March, 1941.

A summary of present knowledge of the physical, physiological, and psychological bases of colour vision is given. J. S. S.

133. Colour Determination.

Parry Moon. Am. Illum. Eng. Soc. Trans., 3, pp. 313-331, March, 1941.

The specification of colour by calculation from spectro-radiometric curves and by direct measurement is discussed. The application of such specifications to lamps, filters, and surfaces is considered. J. S. S.

II.—PHOTOMETRY.

134. Nonograms for Routine Illumination Computations.

W. M. Armstrong. Am. Illum. Eng. Soc. Trans., 4, pp. 503-508, April, 1941.

The use of nonograms is discussed, and three are presented to determine luminous output when the zonal candlepower is known and to solve the equations

$$\theta = \tan - \frac{Id}{h} \;\&\; E = \frac{I \cos^3 \theta}{h^2}$$

J. S. S.

135. A Simple Apparatus for Tracing Spectral Sensitivity Curves.

E. A. Harvey. Phot. J., Vol. 81, p. 231, May, 1941.

A photo-electric density comparator is described which enables iso-density curves to be traced from wedge-spectrograms. R. G. H.

136. Report of the Committee on Theatre Engineering. (a) Projection Practice Sub-Committee.

J. Soc. Mot. Pict. Eng., Vol. 35, p. 549, December, 1940.

A full resume is given of photometric nomenclature and of conversions from one system of units to another. R. G. H.

137. Negative Exposure Control.

D. Norwood. J. Soc. Mot. Pict. Eng., Vol. 36, pp. 389-402, April, 1941.

A system is proposed in which a given reflection factor on the subject is represented by a fixed density in the negative. A photometer has been designed for the application of the system. R. G. H.

III.—SOURCES OF LIGHT.

138. New Fluorescent Lamp.

Anon. Beama Journal, 48, p. 88, May, 1941.

Some details of spectral analysis, construction, and performance of the 5 to 80-W. fluorescent lamp are given. C. A. M.

139. Reflector Lamps.

C. M. Cutler. Magazine of Light, X, No. 2, pp. 32-33, March, 1941.

The use of banks of 300-W. reflection lamps for stage lighting at the Shubert Theatre, New York, is described. C. A. M.

140. The Illuminant in Colour Matching and Discrimination.

Dorothy Nickerson. Am. Illum. Eng. Soc. Trans., 3, pp. 373-399, March, 1941.

Data is given on eighteen light sources, which are rated in order of merit as substitutes for each other in the inspection of coloured cotton samples. J. S. S.

141. Fluorescent versus Gasfilled Lamps.

W. Walton, W. J. Jones, G. V. Downer, G. W. E. Powell. El. Rev. Vol. cxxviii., No. 3,309, p. 598, April 25, 1941. Ditto, No. 3,308, p. 562, April 17, 1941. Ditto, No. 3,307, p. 521, April 11, 1941.

A discussion in the correspondence columns on the relative financial and visual advantages of the fluorescent and gas-filled lamp. R. G. H.

IV.—LIGHTING EQUIPMENT.

142. Lighting and the War Industries.

Anon. Electrician, 126, p. 311, May 30, 1941.

Details are given of the new display of factory lighting equipment at the Elma Lighting Service Bureau to demonstrate the recent Government Lighting Regulations. C. A. M.

143. Bollard Highway Lighting.

W. Shorter. El. Rev., Vol. cxxviii, No. 3,307, p. 553. April 11, 1941.

Describes, with a diagram, a type of unit for mounting on top of a bollard. The reflector over the lamp consists of eleven surfaces, five of which project light over a wide area, and the remaining six are for local light projection. R. G. H.

144. Report of the Committee on Theatre Engineering. (b) Theatre Design Sub-Committee.

J. Soc. Mot. Pic., Eng., Vol. 35, p. 565, Dec., 1940.

A recommendation is made that exit signs in motion picture theatres should be illuminated by green light, and that this should be of a hue known as "admiralty green," which contains blue, green, and yellow, with little or no orange and red. R. G. H.

145. Painting Acoustical Materials.

Anon. Magazine of Light, X, No. 2, pp. 38-41, Mar., 1941.

The painting of ceilings coated with acoustical materials is discussed. Illustrations of various types of material are given. C. A. M.

146. Process Drying by Infra Red Rays.

Anon. Elect., 126, pp. 325-326, June 6, 1941.

A summary is given of present-day practice in America of process drying by infra-red radiation from incandescent lamps. C. A. M.

147. The Lubrication of High Temperature Lighting Devices.

B. H. Porter. Am. Illum. Eng. Soc. Trans., No 4, pp. 499-502, April, 1941.

The characteristics of colloidal graphite are described, and its use as a high temperature lubricant in searchlights and similar equipment is discussed. J. S. S.

V. APPLICATIONS OF LIGHT.

148. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans., 3, pp. 287-292. March, 1941. 4, pp. 471-474. April, 1941.

Some representative architectural lighting schemes are described with photographs. J. S. S.

149. Design of Classrooms for High Level Daylight Illumination.

L. H. Brown. Am. Illum. Eng. Soc. Trans., 3, pp. 411-424. March, 1941.

Existing data are analysed, and designs suggested for providing a high illumination level in classrooms, without exceeding a brightness range of 100 to 1. J. S. S.

150. Case School of Applied Science.

Anon. Magazine of Light, X., No. 2, pp. 27-29. March, 1941.

Details are given of new lighting equipment installed at the Case School of Applied Science, Cleveland. Indirect equipment, particularly of the silvered bowl lamp type, is used extensively. C. A. M.

151. Office Lighting.

L. V. James. Magazine of Light, X., No. 2, pp. 14-15. March, 1941.

Numerous instances of office lighting with fluorescent lamps are given. Both pendant and built-in units are employed. C. A. M.

152. Dental Office Lighting.

Dental Lighting Committee of I.E.S. Am. Illum. Eng. Soc. Trans., 4, pp. 475-488. April, 1941.

An analysis is given of desirable features in lighting equipment for dental work. Experiments to determine the necessary illumination are described. J. S. S.

153. Drawing Office Lighting.

W. G. Darley. Magazine of Light, X., No. 2, pp. 36-37. March, 1941.

A new idea in drawing office lighting is the recessing into the ceiling of continuous lengths of diffused lighting units all at 45° to the axis of the room. Drawing boards remain parallel to the sides of the room. It is found that both direct and reflected glare and shadows are reduced. C. A. M.

154. Lighting in South Africa.

Anon. Electrician, 126, pp. 313-314. May 30, 1941.

Details of normal lighting installations in South Africa include a brief description with photograph of the civic centre at Pretoria. Sixty lamp standards are used, seventy feet apart, each using a combination of a normal high pressure mercury vapour lamp with lengths of white fluorescent tubing. Illumination values range between 0.5 and 2 f.c. C. A. M.

155. The Effects of Tree Shading of Street Lights on Visibility.

K. L. Partridge. Am. Illum. Eng. Soc. Trans., 4, pp. 495-496. April, 1941.

Measurements of road brightness, object brightness, and veiling brightness in installations where part of the light from street lamps was obscured indicate a decrease in relative effective illumination of from 23% to 40%. J. S. S.

156. The Illumination of Statuary.

L. R. Steinhardt. Am. Illum. Eng. Soc. Trans., 4, pp. 509-513. April, 1941.

A method is described in which the object is first illuminated by normal methods to give the desired effect. A photograph of the object is then taken, using a lantern slide projector as a comera, and a slide is prepared. The area surrounding the image on the slide is blacked out. The lantern and slide may then be used to illuminate the object. J. S. S.

157. Show Window Lighting Laboratory.

Anon. Magazine of Light, X., No. 2, pp. 10-11, 33. March, 1941.

The use of fluorescent lighting equipment for shop window purposes is tried out to suit the required window dressing on an experimental scale before its duplication in the various branches of a multiple shoe store organisation. C. A. M.

158. Luminous Advertising.

H. J. Chanon. Magazine of Light, X., No. 2, pp. 34-35. March, 1941.

Details with a diagram are given of the combination of filament and tubular fluorescent lamps in sign lighting. C. A. M.

159. Tiffany's Lighting.

R. W. Morris. Magazine of Light, X., No. 2, pp. 7-9. March, 1941.

Problems associated with the lighting for the display and repair of jewellery are discussed. C. A. M.

160. Improved Illumination for Textile Operation with Fluorescent Lamps.

D. P. Caverley. Am. Illum. Eng. Soc. Trans., 4, pp. 489-493. April, 1941.

It is claimed that results obtained in textile mills with fluorescent tubular lamps are superior to that obtainable with incandescent lighting. J. S. S.

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VI.—MISCELLANEOUS.

161. Technical Progress in Kinematography.

R. Howard Cricks. Phot. J., Vol. 81, pp. 209-213, April, 1941.

Progress in motion picture technique is summarised, including applications of the compact-source discharge lamp, and uses of luminescence. R. G. H.

162. Report of the Standards Committee.

J. Soc. Mot. Pict. Eng., Vol. 35, p. 566. December, 1940.

The Standards Committee of the Society of Motion Picture Engineers propose to recommend that the screen brightness shall be 10 foot-lamberts (i.e., 10 e.f.c.) plus 4 or minus 1 when the projector is running with no film in the gate. This is a change from the previous recommendation of 7 to 14 foot-lamberts. R. G. H.

163. Report of the Studio Lighting Committee.

J. Soc. Mot. Pict. Eng., Vol. 35, p. 607. December, 1940.

New lamps and studio lighting equipment are summarised Of particular interest is the Edgerton high-speed mercury lamp, which allows motion pictures at 1,000 frames per second to be produced. R. G. H.

164. American Motion Picture Standards and Recommended Practices.

Anon. J. Soc. Mot Pict. Eng., Vol. 36, pp. 217-260. March, 1941.

The latest standards are given in full, together with a set of data on "American Recommended Practice" for various quantities and techniques. R. G. H.

165. Report of the Television Committee.

J. Soc. Mot. Pict. Eng., Vol. 35, p. 569. December, 1940.

A summary and bibliography is given of work on flicker and visual fatigue, with special reference to television problems. R. G. H.

166. Photographic Progress in 1941.

G. E. Matthews. Phot. J., Vol. 81, pp. 174-191, April, 1941.

A full review of photographic progress in manufacture, technique, and apparatus is given. R. G. H.

167. Photography Applied to Engineering.

D. A. Spencer. Phot. J., Vol. 81, p. 159. April, 1941.

Describes, amongst other applications of photography to engineering, the use of high intensity flash lamps for instantaneous photography and cinematography, and the use of infra-red radiation in photography. R. G. H.

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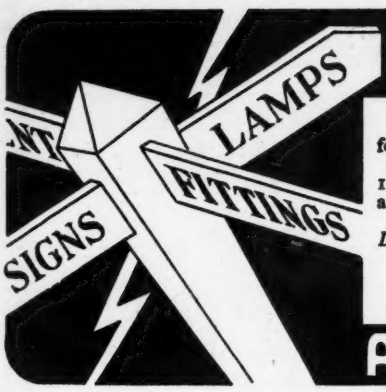

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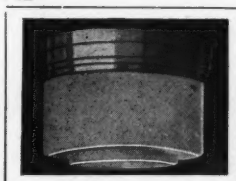

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Crompton & Kye Lamp Depot: New Headquarters

It is now permissible to state that some little time ago the Crompton and Kye Lamp Depot of Messrs. Crompton, Parkinson, Ltd., situated in Brixton, was almost completely destroyed by enemy action. Only the outer walls were left standing, though the familiar large neon sign and clock remained intact. Within a few hours, however, the staff were installed at Electra House, Victoria Embankment, the London headquarters, and business was continuing. A complete replacement of stock of lamps was soon assembled, and a new trade counter opened at Ferguson House, 124, City-road, E.C.1, where all is now proceeding as before.

Ediswan "Industra" Reflectors

In a recent Ediswan catalogue reflectors for industrial lighting are illustrated in great variety. Particulars of discharge lamps and accessories are also given. At the commencement some hints on the planning of installations and lists of service values of illumination for various processes are included. A separate inset deals with fluorescent lighting by means of the new 80-watt 5 ft. tubular lamp.